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EXAMINER

LEE, SIN J

ART UNIT

PAPER NUMBER

1752

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/059,210

Applicant(s)

OOMORI ET AL.

Examiner

Sin J. Lee

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/291,116.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 5) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

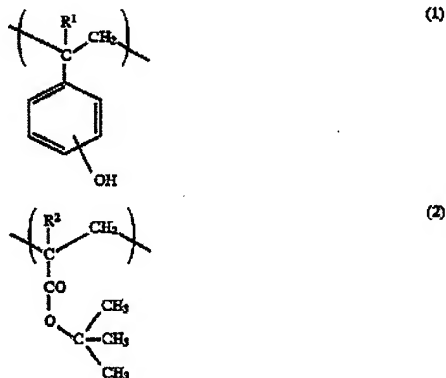
DETAILED ACTION

1. Upon reconsideration, the previous 103(a) rejection made on claim 12 over Yamachika et al'495 in view of Padmanaban et al'128 is hereby withdrawn as it is the Examiner's position that Yamachika in view of Padmanaban does not teach present invention of claim 12; as described below in Paragraph 3, Yamachika renders obvious a mixture of two polymers, each of which is made of hydroxystyrene, tert-butyl acrylate and styrene units. However, the prior art does not teach or suggest the mixing ratio of those two polymers in the mixture, nor does the prior art recognize the mixing ratio as a result-effective variable. Therefore, Yamachika in view of Padmanaban does not teach or suggest present invention of claim 12.

2. Due to new grounds of rejections, the following rejections are made *non-final*.

3. Claims 1-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamachika et al (5,679,495) in view of Padmanaban et al (5,852,128).

Yamachika teaches (see abstract) a radiation sensitive resin composition comprising a polymer which becomes alkali-soluble in the presence of an acid and a photoacid generator, and Yamachika's radiation sensitive resin composition is dissolved in an organic solvent (see col.12, lines 23-67, col.13, lines 1-14). Yamachika's polymer has the following recurring units (1) and (2)



(wherein R^1 and R^2 independently represent a hydrogen atom or a methyl group) and another recurring unit C). See col.3, lines 25-53. As examples for the monomer which forms the recurring unit C), Yamachika teaches vinyl group-containing compounds and (meth)acryloyl group-containing compounds. As specific examples for the vinyl group-containing compounds, the prior art teaches six kinds of compounds one of which is aromatic alkenyl compounds. Furthermore, as one of the four specific examples for the aromatic alkenyl compounds, the prior art teaches *styrene*. See col.4, lines 42-50.

Yamachika et al shows its preference for *hydroxystyrene* as its recurring unit (1), *tert-butyl acrylate* as its recurring unit (2), and styrene as its recurring unit C) by synthesizing a polymer of hydroxystyrene, tert-butyl acrylate and styrene in its Synthesis Example 1. Yamachika teaches (col.3, lines 58-61, col.4, lines 5-8, lines 14-21) the proportion of the recurring unit (1) (such as hydroxystyrene), recurring unit (2) (such as tert-butyl acrylate), and recurring unit C) (such as styrene) in his polymer to be 5-75%, 10-70%, and 0.5-50% respectively. Yamachika also teaches (col.4, lines 63-67)

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that the weight-average molecular weight for his polymer is preferably 1,500 to 300,000. Furthermore, Yamachika states in col.5, lines 9-20 that as his polymer, there may be used a mixed polymer consisting of at least *two polymer mixtures* selected from a mixture of the polymers different in the proportions of each monomer units in the above-mentioned range and a mixture of the polymers different in Mw in the above-mentioned ranges. *Even when the mixed polymer is used as the polymer, Yamachika states that it is preferable that the proportions of each of the monomer units and Mw fall within the above-mentioned ranges.* Based on Yamachika's teaching, it would have been obvious to one of ordinary skill in the art to use the mixture of two polymers of hydroxystyrene, tert-butyl acrylate (the tert-butyl group of tert-butyl acrylate is present solubility-reducing group of claims 1-3) and styrene, which are different in the proportions of each monomer units in the above-mentioned ranges (i.e., 5-75% of hydroxystyrene unit, 10-70% of tert-butyl acrylate unit, and 0.5-50% of styrene unit) and different in Mw in the above-mentioned ranges (1,500 to 300,000) (*however, keeping the proportions of each of the monomer units and Mw of each polymer within the above-mentioned ranges*) with a reasonable expectation of obtaining a radiation sensitive resin composition which is free from volume shrinkage, peeling failure and adhesive failure, can form a high precision pattern and has high dry etching resistance. The prior art's range of 5-75% of hydroxystyrene unit overlaps with present range of 62-68 mol% of the hydroxyl group-containing styrene unit both in the first and second copolymeric resins. The prior art's range of 0.5-50% of styrene unit overlaps with present range of 15-25 mol% of the styrene unit in the first copolymeric resin and with present range of 25-35

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mol% of the styrene unit in the second copolymeric resin. The prior art's range of 10-70% of tert-butyl acrylate unit overlaps with present range of 12-18 mol % of the (meth)acrylate ester unit in the first copolymeric resin. Therefore, prior art's ranges would have made present ranges mentioned above *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In the Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Also, although, the prior art's range of 10-70% of tert-butyl acrylate unit does not overlap with present range of 2-8 mol % of (meth)acrylate ester unit in the second copolymeric resin, it is the Examiner's position that the lower end of the prior art's range and the higher end of the present range are close enough that one skilled in the art would have expected them to have the same properties, and thus a *prima facie* case of obviousness would exist as to the present range which may be overcome by a showing of unexpected results. Where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, a *prima facie* case of obviousness would also exist which may also be overcome by a showing of unexpected results, In re Titanium Metals Corporation of America v. Banner, 227 USPQ 773 (Fed. Cir. 1985). Therefore, Yamachika's teaching would render obvious present component (A) of claim 1.

As to the photoacid generator, Yamachika teaches (col.7, lines 61-64) that it is used in the amount of 0.05 to 20 parts by weight per 100 parts by weight of his polymer, and Yamachika specifically teaches triphenylsulfonium triflate (which is another name

for triphenylsulfonium trifluoromethane sulfonate) in his working examples (see Examples 1, 4, 7, and 13). Padmanaban et al teaches the equivalence of triphenylsulfonium trifluoromethane sulfonate to triphenylsulfonium nonafluorobutane sulfonate (an onium salt containing a fluoroalkyl sulfonate ion having 4 carbon atoms as the anion) as onium salt-type photo initiators which can be used together with their acid-labile group-protected polymer or copolymer (see col.3, lines 53-65, col.8, lines 48-52) in a radiation sensitive composition. Because Yamachika's polymer also contains an acid-labile group (i.e., the tert-butyl group in the tert-butyl (meth)acrylate unit), and because Yamachika's triphenylsulfonium trifluoromethane sulfonate and triphenylsulfonium nonafluorobutane sulfonate were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to use *triphenylsulfonium nonafluorobutane sulfonate* as the photoacid generator in Yamachika's radiation sensitive composition in the amount of 0.05 to 20 parts by weight per 100 parts by weight of Yamachika's polymer. The prior art's range of 0.05 to 20 parts by weight per 100 parts by weight of the polymer overlaps with present range of 1-20 parts by weight of the photoacid generator per 100 parts by weight of the present component (A), and thus the prior art's range would have made the present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika in view of Padmanaban would render obvious present positive-working chemical amplification photo resist compositions of claims 1-4 and 9.

With respect to present claim 5, Since Yamachika teaches that the weight-average molecular weight for his polymer or polymer mixture is preferably 1,500 to

300,000, and since this range overlaps with present range of 3000 to 30000, the prior art's range would have made the present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika in view of Padmanaban would render obvious present invention of claim 5.

With respect to present claim 6, Yamachika teaches (col.19, lines 50-60) the addition of an acid-diffusion controller into his radiation sensitive composition in order to improve pattern shape. As examples for the acid-diffusion controller, the prior art includes (col.10, lines 61-67, col.11, lines 1-4) secondary amine compounds as well as tertiary amine compounds, and specifically the prior art uses *tripropylamine* and *tri-n-butylamine* in its working examples (see Table 1 and col.19, lines 62-65). The prior art also teaches (col.11, lines 30-33) the amount of the acid-diffusion controller to be 0.001-10 parts by weight per 100 parts by weight of it polymer, and this range is the same as the present range of claim 6. Therefore, Yamachika in view of Padmanaban would render obvious present invention of claim 6.

4. Claims 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamachika et al (5,679,495) in view of Padmanaban et al (5,852,128) as applied to claim 1 above, and further in view of Sato et al (5,955,240).

Yamachika et al in view of Padmanaban et al do not teach present carboxylic acid compounds of claims 7 and 11. Sato et al teaches (col.10, lines 34-42) adding an organic carboxylic acid compound to a positive photo resist composition in order to improve a sensitivity, a resolution, good width characteristic in focus depth and to achieve resist patterns with good profiles and good post-exposure storage stability. As

examples for the organic carboxylic acid compound, the prior art teaches (col.10, lines 43-49) six different kinds of compounds one of which is aromatic carboxylic acid compound (besides, aromatic carboxylic acid compound is also taught as one of the three *especially preferred* kind – see col.11, lines 27-29). Based on Sato's teaching, it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add an aromatic carboxylic acid compound to Yamachika's positive resin composition with a reasonable expectation of improving in sensitivity, resolution, good width characteristic in focus depth and obtaining resist patterns with good profiles and good post exposure storage stability as taught by Sato. Since Sato teaches (col.11, lines 62-67) the proportion of the organic carboxylic acid compound to be 0.01 to 1%, and since this range overlaps with present range of claim 7, the prior art's teaching would have made the present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika in view of Padmanaban and Sato would render obvious present inventions of claims 7 and 11.

5. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamachika et al (5,679,495) in view of Padmanaban et al (5,852,128) as applied to claims 1 and 6 above respectively, and further in view of Watanabe et al (5,972,559).

As discussed above in Paragraph 3, Yamachika specifically teaches tributylamine as his acid-diffusion controller (see Example 16 and col.19, line 65). Watanabe et al teaches (see Table 1) the equivalence of tributylamine to triethanolamine or N,N-dimethylacetamide as acid-diffusion suppressing-basic compounds. Therefore, one of ordinary skill in the art would have found it obvious to

use triethanolamine (*which is a tertiary alkanolamine*) or N,N-dimethylacetamide as Yamachika's acid-diffusion controller because tributylamine, triethanolamine, and N,N-dimethylacetamide were art-recognized equivalents at the time the invention was made. Therefore, Yamachika in view of Padmanaban and further in view of Watanabe would render obvious present inventions of claims 8 and 10 (as discussed above in Paragraph 3 with respect to present claim 6, Yamachika teaches the amount of his acid-diffusion controller to be 0.001-10 parts by weight per 100 parts by weight of his polymer, and since this range overlaps with present range of claim 8, Yamachika in view of Padmanaban and further in view of Watanabe would render obvious present invention of claim 8).

Double Patenting

6. Claims 1, 4, and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 9, and 10 of U.S. Patent No. 6,255,041 B1 in view of Yamachika et al (5,679,495).

Claim 1 of Pat.'041 states the following;

1. A method for the formation of a patterned resist layer on a substrate surface which comprises the steps of:

- (1) forming, on the surface of a substrate, a coating layer of a positive-working chemical-amplification photore-sist composition comprising, as a uniform solution in an organic solvent:
 - (A) a copolymeric resin consisting of (a) from 50 to 85% by moles of hydroxyl group-containing styrene units, (b) from 15 to 35% by moles of styrene units and (c) from 2 to 20% by moles of acrylate or methacrylate ester units each having a solubility-reducing group capable of being eliminated in the presence of an acid, the total of the molar fractions of the monomeric units (a), (b) and (c) being 100%; and
 - (B) a radiation-sensitive acid-generating agent which is an onium salt containing a fluoroalkyl sulfonate ion having 1 to 10 carbon atoms as the anion;
- (2) subjecting the coating layer to a first heat treatment at a temperature in the range from 120° C. to 140° C.
- (3) exposing the coating layer pattern-wise to actinic rays;
- (4) subjecting the coating layer to a second heat treatment at a temperature in the range from 110° C. to 130° C., the temperature of the second heat treatment being lower than the temperature of the first heat treatment; and
- (5) subjecting the coating layer to a development treatment.

Also, claims 9 and 10 of Pat.041 state the following;

9. The method for the formation of a patterned resist layer as claimed in claim 1 in which the component (A) is a combination of a first copolymeric resin consisting of from 62 to 68% by moles of the monomeric units (a), from 15 to 25% by moles of the monomeric units (b) and from 12 to 18% by moles of the monomeric units (c) and a second copolymeric resin consisting of from 62 to 68% by moles of the monomeric units (a), from 25 to 35% by moles of the monomeric units (b) and from 2 to 8% by moles of the monomeric units (c) in a weight proportion in the range from 9:1 to 5:5.

10. The method for the formation of a patterned resist layer as claimed in claim 1 in which the component (B) is an onium salt compound having a trifluoromethane sulfonic acid ion or nonafluorobutane sulfonic acid ion as the anion.

In view of the teachings of claims 9 and 10, it would have been obvious to one of ordinary skill in the art to use the combination of the first and second copolymeric resins as described in claim 9 as the component (A) of claim 1 of Pat.'041 and use the onium salt compound having nonafluorobutane sulfonic acid ion as the anion (since there are only two choices given in claim 10) as the component (B) of claim 1 of Pat.'041 with a reasonable expectation of obtaining a patterned resist layer on a substrate surface. Although Pat.'041 does not disclose the amount of its photoacid generator to be used, it is known in the art to use such photoacid generator in the amount of 0.05 to 20 parts by weight per 100 parts by weight of a polymeric resin, as evidenced by Yamachika et al (see claims 1 and 12). Since Pat.'041 is silent as to the amount of its photoacid generator, it would have been obvious to one of ordinary skill in the art to use the photoacid generator of Pat.'041 in the amount that is known in the art, e.g., 0.05-20 parts by weight per 100 parts by weight of the combination of the first and second copolymeric resins with a reasonable expectation of obtaining a patterned resist layer

on a substrate surface. Since the range of 0.05-20 parts by weight overlaps with present range of 1-20 parts by weight, the prior art's range would have made present range *prima facie* obvious. See In re Wertheim, supra. Therefore, claims 1, 9, and 10 of Pat.'041 in view of Yamachika would render obvious present inventions of claims 1, 4, and 12.

7. Claims 2 and 3 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 9, 10, 5, and 6 of U.S. Patent No. 6,255,041 in view of Yamachika et al (5,679,495).

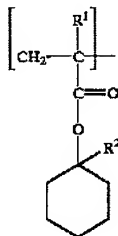
Claim 5 of Pat.'041 states that the solubility-reducing group of claim 1 is selected from the group consisting of tertiary alkyl groups, 1-alkoxyalkyl groups and acetal groups, and claim 6 furthermore states that the tertiary alkyl group of claim 5 is tert-butyl group. Based on the teachings of claims 5 and 6, it would have been obvious to one of ordinary skill in the art to have the tert-butyl group as the solubility-reducing group of claim 1 with a reasonable expectation of obtaining a patterned resist layer on a substrate surface. Therefore, claim 1, 9, 10, 5, and 6 of Pat.'041 in view of Yamachika would render obvious present inventions of claims 2 and 3.

8. Claims 1, 2, 4, 9, and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 7 of U.S. Patent No. 6,340,553 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of Pat.'553 states the following;

1. A positive-working chemical-amplification photoresist composition which comprises, as a uniform solution in an organic solvent:

(A) a resinous ingredient capable of being imparted with an increase in solubility in an aqueous alkaline solution by interacting with an acid and consisting essentially of (a) hydroxystyrene units or hydroxy- α -methylstyrene units, (b) styrene units and (c) 1-alkylcyclohexyl (meth)acrylate units represented by the general formula



in which R^1 is a hydrogen atom or a methyl group and R^2 is an alkyl group having 1 to 5 carbon atoms, and wherein component (A) is a combination of a first copolymeric resin consisting essentially of the monomeric units (a), (b) and (c) in molar fractions of 50 to 70%, 10 to 30% and 10 to 20%, respectively, and a second copolymeric resin consisting essentially of the monomeric units (a), (b) and (c) in molar

fractions of 50 to 70%, 20 to 40% and 2 to 10%, respectively, in a weight proportion in the range from 90:10 to 50:50;

(B) a radiation-sensitive acid-generating agent capable of releasing an acid by irradiation with actinic rays in an amount in the range from 1 to 10 parts by weight per 100 parts by weight of the component (A).

Also, claim 7 of Pat.'553 states that the component (B) of claim 1 is an onium salt compound having a fluoroalkylsulfonate ion of 1-10 carbon atoms as the anion. Since there are only ten choices (i.e., an onium salt compound having a fluoroalkylsulfonate ion of 1 carbon atom, an onium salt compound having a fluoroalkylsulfonate ion of 2

carbon atoms, an onium salt compound having a fluoroalkylsulfonate ion of 3 carbon atoms, . . . an onium salt compound having a fluoroalkylsulfonate ion of 10 carbon atoms), it would have been obvious to one of ordinary skill in the art to use an onium salt compound having a fluoroalkylsulfonate ion of 4 carbon atoms (i.e., an onium salt compound having a nonafluorobutane sulfonate ion as the anion) as the component (B) of claim 1 in the amount of 1-10 parts by weight per 100 parts by weight of the component (A) with a reasonable expectation of forming a positive-working chemical-amplification photoresist composition. Therefore, claim 1 in view of claim 7 of Pat.'553 would render obvious present component (B) of present claims 1 and 4 (since the amount of 1-10 parts by weight of the component (B) per 100 parts by weight of the component (A) overlaps with present range of 1-20 parts by weight of the component (B) based on 100 parts by weight of the component (A), the prior art's range would have made present range *prima facie* obvious, see In re Wertheim, supra).

Based on the teaching of claim 1 of pat.'553, it would have been obvious to one of ordinary skill in the art to use the combination of a first and second copolymeric resins, each of which is formed of hydroxystyrene unit, styrene unit and 1-alkylcyclohexyl (meth)acrylate unit (*the 1-alkylcyclohexyl group being the present tertiary alkyl, solubility-reducing group of claims 1 and 2*), in a weight proportion in the range from 90:10 to 50:50 with a reasonable expectation of forming a positive-working chemical-amplification photoresist composition. Those molar fraction ranges listed in claim 1 of Pat.'553 for each of those monomer units overlap with present ranges of present claim 1. Therefore, the prior art's ranges would have made present ranges

prima facie obvious. See In re Wertheim, supra. Therefore, claim 1 of Pat.'553 in view of claim 7 would render obvious present inventions of claims 1, 2, 4, 9, and 12.

9. Claim 6 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 7, and 2 of U.S. Patent No. 6,340,553 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons: Claim 2 of Pat.'553 states that the composition of claim 1 further comprises an aliphatic tertiary amine compound in an amount in the range from 0.01-1.0 part by weight per 100 parts by weight of the component (A). Therefore, it would have been obvious to one of ordinary skill in the art to add an aliphatic tertiary amine compound to the composition of claim 1 of Pat.'553 in the amount of 0.01-1.0 part by weight per 100 parts by weight of the component (A) with a reasonable expectation of obtaining a positive-working chemical-amplification photoresist composition. The prior art's range of 0.01-1.0 part by weight overlaps with present range of 0.001-10 parts by weight of present claim 6, and thus the prior art's range would have made present range *prima facie* obvious. See In re Wertheim, supra. Therefore, claims 1, 7, and 2 of Pat.'553 would render obvious present invention of claim 6.

10. Claim 10 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 7, 2, and 3 of U.S. Patent No. 6,340,553 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons: Claim 3 of Pat.'553 states that the aliphatic tertiary amine compound of claim 2 is a trialkanolamine compound.

Therefore, it would have been obvious to add a trialkanolamine compound to the composition of claim 1 of Pat.'553 in the amount of 0.01-1.0 part by weight per 100 parts by weight of the component (A) with a reasonable expectation of obtaining a positive-working chemical-amplification photoresist composition. Therefore, claims 1, 7, 2, and 3 of Pat.'553 would render obvious present invention of claim 10.

Response to Arguments

11. Applicants argue that Yamachika, either alone or in combination with Padmanaban, is not suggestive of the formulation of a photoresist composition in which the resinous component is a combination of two copolymeric resins consisting of the same types of monomeric units but in different molar fractions for the respective types of the monomeric units. The Examiner disagrees. As already stated above in Paragraph 3, Yamachika states in col.5, lines 9-20 that as his polymer, there may be used a mixed polymer consisting of at least two polymer mixtures selected from a mixture of the polymers *different in the proportions of each monomer units* in the above-mentioned range and a mixture of the polymers *different in Mw* in the above-mentioned ranges. Although Yamachika states that the polymer mixtures are different in the proportions of each monomer units or in Mw, Yamachika does not state that those polymer mixtures are to be different in the types of monomeric units. Therefore, it is still the Examiner's position that based on Yamachika's teaching, it would have been obvious to one of ordinary skill in the art to use the mixture of two polymers of hydroxystyrene, tert-butyl acrylate and styrene, which are different in the proportions of

each monomer units in the above-mentioned ranges (i.e., 5-75% of hydroxystyrene unit, 10-70% of tert-butyl acrylate unit, and 0.5-50% of styrene unit) (*however, keeping the proportions of each of the monomer units in each polymer within the above-mentioned ranges*) with a reasonable expectation of obtaining a radiation sensitive resin composition which is free from volume shrinkage, peeling failure and adhesive failure, can form a high precision pattern and has high dry etching resistance.

Applicants also argue that the advantages obtained with such a combination of the copolymeric resins are clear when comparison is made between Example 1 and 2 and Comparative Examples 1 and 3 of the application in respect to the cross-sectional profile of the patterned resist layer, photosensitivity, pattern resolution and other properties. However, those comparative experiments mentioned above are not successful in showing unexpected superior results of using the combination of the copolymeric resins because those examples are not commensurate in scope with the broadest claim of present invention (i.e., those examples contain preferred embodiments of other dependent claims - see MPEP 716.02(d)). Also, the comparison was not made to the closest prior art (see MPEP 716.02(e)).

Applicants point out that the molar fraction of the (meth)acrylate ester units in the resin of Yamachika is preferably from 20-50% whereas the molar fraction of the monomeric unit (c) in the present claim 1 is 12-18% for the first resin and 2-8% for the second resin. However, the Examiner would like to point out that Yamachika clearly states (see col.4, lines 5-8) that "[t]he proportion of the number of the recurring units B is *preferably 10 to 70%*, more preferably 20 to 50%, based on the total number of all the

recurring units in the polymer (A)." Therefore, since Yamachika teaches that his (meth)acrylate ester units are present in the amount of 10-70% *preferably*, 20-50% more preferably, it would still have been obvious to one of ordinary skill in the art to use Yamachika's (meth)acrylate ester units in the amount of 10-70% with a reasonable expectation of obtaining a radiation sensitive resin composition which is free from volume shrinkage, peeling failure and adhesive failure, can form a high precision pattern and has high dry etching resistance, and thus obviousness exists as to the present range of 12-18% for the first resin and 2-8% for the second resin as explained above in Paragraph 3.

Applicants argue that the types of the base resin are very different between Sato and the present invention, and thus Sato cannot be suggestive of the advantage of a carboxylic acid obtained in the present invention. The Examiner disagrees. Although Sato's resin and Yamachika's resin are not exactly the same, both of those resins are resins having acid-labile groups which are used in a positive photoresist composition. Sato teaches that adding an organic carboxylic acid compound improves sensitivity, resolution, good width characteristic in focus depth and brings resist patterns with good profiles, and it is the Examiner's position that those advantages will still be obtained when one adds an organic carboxylic acid compound to Yamachika's positive photoresist composition.

Applicants finally argues that in view of the very great difference in the types of the base resins between Watanabe and the present invention, Watanabe cannot be relied on for the teaching of the equivalence of N,N-dimethylacetamide to triethylamine

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and triethanolamine. First of all, Watanabe et al is being relied on for the teaching of the equivalence of tributylamine (which is used in one of Yamachika's working examples) to triethanolamine or N,N-dimethylacetamide as acid-diffusion suppressing-basic compounds. Secondly, although Watanabe's resin and Yamachika's resin are not exactly the same, both of those resins are resins containing acid-labile group which are used in a positive resist composition. Since Watanabe teaches the equivalence of tributylamine (which is used in one of Yamachika's working examples) to triethanolamine or N,N-dimethylacetamide as acid-diffusion suppressing-basic compounds, one of ordinary skill in the art would have found it obvious to use triethanolamine (*which is a tertiary alkanolamine*) or N,N-dimethylacetamide as Yamachika's acid-diffusion controller with a reasonable expectation of obtaining the same result of suppressing acid-diffusion in Yamachika's invention.

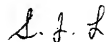
For the reasons stated above, present rejections still stand.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (571)272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



S. Lee
December 31, 2003



Sin J. Lee
Patent Examiner
Technology Center 1700